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PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS

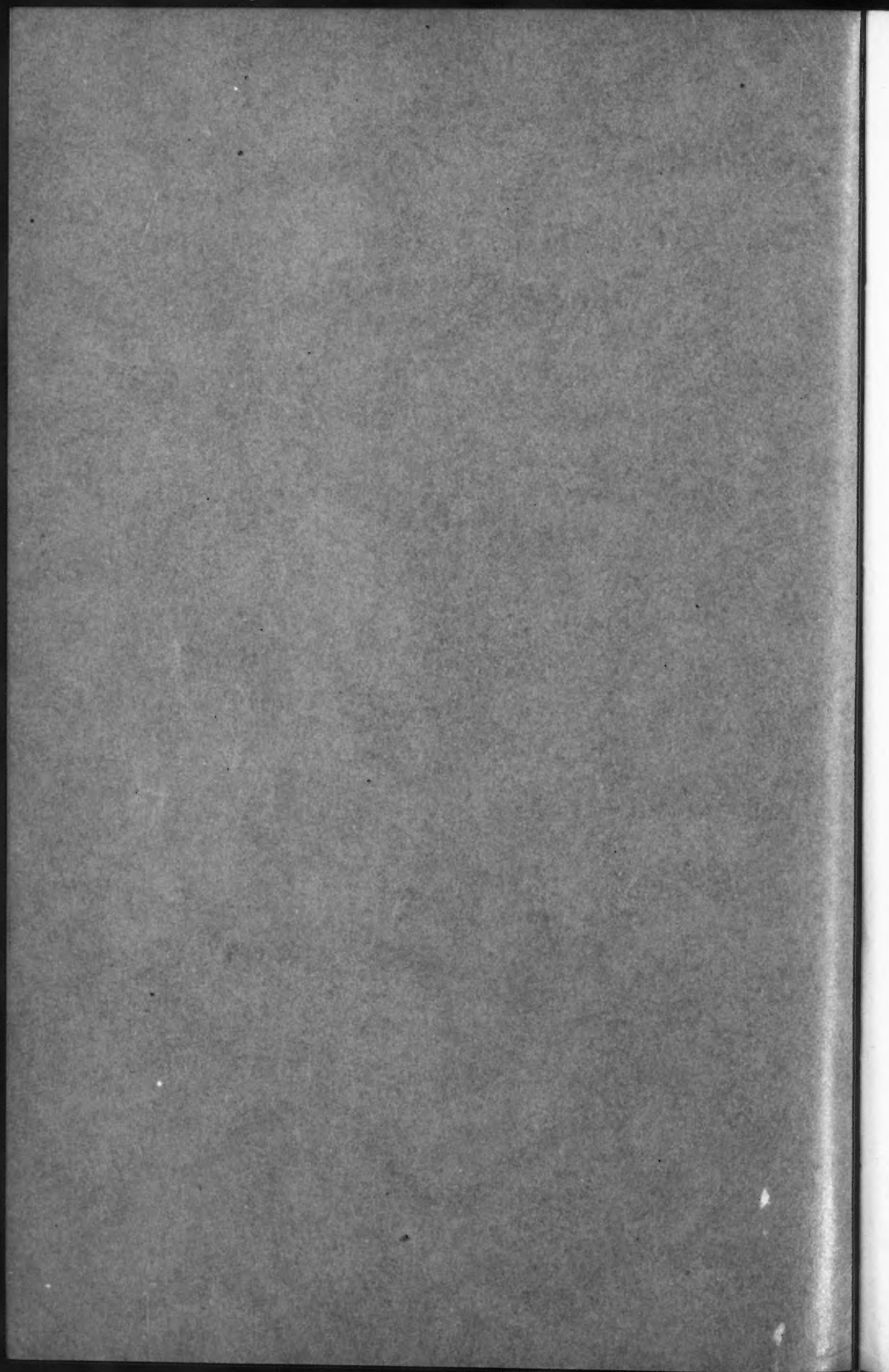
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PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS
(INSTITUTED 1852)

VOL. XLIII—No. 4

APRIL, 1917

Edited by the Secretary, under the direction of the Committee on Publications.

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NEW YORK 1917

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TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, Edwin Duryea, E. G. Haines, Allen Hazen, James C. Meem, Walter J. Douglas.

ON THE REGULATION OF WATER RIGHTS: F. H. Newell, W. C. Hoad, John H. Lewis.

TO REPORT ON STRESSES IN RAILROAD TRACK: A. N. Talbot, A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, Robert W. Hunt, George W. Kittredge, Paul M. LaBach, C. G. E. Larsson, G. J. Ray, Albert F. Reichmann, H. R. Safford, F. E. Turneure, J. E. Willoughby.

The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER.....1446 Circle.

CABLE ADDRESS....."Ceas, New York."

* Director Otis F. Clapp died March 3d, 1917.

AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed in its publications.

SOCIETY AFFAIRS

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MINUTES OF MEETINGS

OF THE SOCIETY

March 14th, 1917.—Special Meeting.—The meeting was called to order at 8.30 P. M.; Vice-President Kittredge in the chair; Chas. Warren Hunt, Secretary; and present, also 462 members and guests.

J. deB. W. Gardiner, Assoc. M. Am. Soc. C. E., formerly an officer in the United States Army, and at present Military Expert for *The New York Times*, addressed the meeting on "The Present Situation of the Great War", with an exposition of the strategy and tactics which led up to the present conditions, and, based on the events of the past two years, a discussion of the logical outcome. Mr. Gardiner illustrated his address with lantern slides.

Adjourned.

March 21st, 1917.—The meeting was called to order at 8.30 p. m.; Director Alfred D. Flinn in the chair; Chas. Warren Hunt, Secretary; and present, also, 110 members and 16 guests.

A paper by F. W. Scheidenhelm, M. Am. Soc. C. E., entitled "The Reconstruction of the Stony River Dam," was presented by the author and illustrated with lantern slides.

A communication on the subject from Edward Godfrey, M. Am. Soc. C. E., was read by the Secretary.

The paper was discussed orally by Messrs. Charles E. Gregory, Edward Wegmann, and William P. Creager. The Secretary announced that he had received written discussions from Messrs. J. K. Finch, J. W. Ledoux, P. Rutenberg, Fred F. Moore, W. S. Downs, and H. L. Coburn, but could not present them owing to the lateness of the hour.

The Secretary announced the election of the following candidates, on March 13th, 1917:

AS MEMBERS

BORIS ALEXANDROWITCH BAKHMETEFF, Petrograd, Russia

WILLIAM BOWIE, Washington, D. C.

GUY HERBERT CHASE, Fitchburg, Mass.

ELBRIDGE ROBBINS CONANT, Savannah, Ga.

CLEMENT ALEXANDER FINLEY FLAGLER, Washington, D. C.

ALFRED LAMAR HARTRIDGE, Boston, Mass.

ERNEST DEMAREST HENDRICKS, Fort Plain, N. Y.

FRANK AVIL HOLBY, New York City

FRANK HUTCHINSON, Riverton, Minn.

JAMES HOUSTOUN JOHNSTON, Atlanta, Ga.

FREDERICK MERRICK JOY, Birmingham, Ala.

CHARLES PAUL KEYSER, Portland, Ore.

RICHARD LEVI MILLER, St. Louis, Mo.

HERBERT GEORGE MOULTON, New York City

CHARLES UNDERHILL POWELL, Flushing, N. Y.

SERGEI NICOLAEVITCH SISSOEFF, Petrograd, Russia

WILLIAM STEWART THOMSON, Buffalo, N. Y.

EDWARD GARLAND TRUEHEART, Montevideo, Uruguay

JOHN FAIRFIELD VAUGHAN, Boston, Mass.

AS ASSOCIATE MEMBERS

RALPH BENJAMIN ALLEN, Albany, N. Y.

HOWARD ROYSTON ANDERSON, Mt. Hope, W. Va.

ARTHUR GARRATT ATKINSON, Ukiah, Cal.

MANCHE OWEN BENNETT, Pendleton, Ore.

ERNEST WILLIAM BENNISON, Corning, Iowa

HANS BERENTS, Shanghai, China

ROLLO KIMBALL BLANCHARD, New York City
EDWARD SORREL BLECH, Cienfuegos, Cuba
GEORGE HARLEY BURNETTE, Brownsville, Pa.
EDWIN WALKER BUXTON, Kansas City, Mo.
HENRY CARRINGTON, Tampico, Mexico
WILLIAM FRANKLIN CARSON, Philadelphia, Pa.
HUGH RUBEN CARTER, Little Rock, Ark.
CLOYDE CLEAVER CHAMBERS, Dayton, Ohio
WILBUR SHERMAN CORKRAN, Wilmington, Del.
ALBERT ELI CRANE, Augusta, Ga.
WALDO EDGAR DODGE, Berkeley, Cal.
GUY BANKER EDWARDS, Cleveland, Ohio
EARLE WALKER FASSETT, Los Angeles, Cal.
WILLIAM ANTHONY GOLDEN, New York City
EXUM MOSES HAAS, Cleveland, Ohio
KENNETH DOUGLASS HAUSER, Vancouver, B. C., Canada
HENRY AMYATT CHAUNDY HELLYER, Tenafly, N. J.
LINDSAY COATES HERKNESS, New York City
LORING KENNETH JORDAN, San Francisco, Cal.
CHARLES PORTERFIELD KAHLER, Salt Lake City, Utah
RAYMOND EARL KERR, Morgantown, W. Va.
VALENTINE ODELL KETCHAM, Wilmington, Del.
ERNEST KITCHEN, St. Petersburg, Fla.
ALFRED HARRY LABSAP, Riverton, La.
WALTER COLTON LITTLE, JR., San Luis Obispo, Cal.
ARTHUR RUSSELL LORD, Chicago, Ill.
ARTHUR LOUIS LUEDKE, Washington, D. C.
JOSEPH GIOVANNI LUZZATTO, New York City
EDWARD HERBERT MCCONNELL, Nashville, Tenn.
ROGER BARTON MCWHORTER, Dayton, Ohio
LUTHER ROBINSON MADDOX, Chattanooga, Tenn.
THEODORE RUSSELL MAUL, South Bethlehem, Pa.
ALFRED HAROLD METCALFE, Rochester, N. Y.
CHARLES LOUIS MEYER, Omaha, Nebr.
IRVING CLARK MOLLER, Antofagasta, Chile
CLARENCE MORIARTY, Sioux City, Iowa
ARTHUR MILLER PORTER, Redwood City, Cal.
HENRY EDWARD RIEXINGER, Buffalo, N. Y.
JOHN RODERICK SEXTON, Meadville, Pa.
VICTOR CHARLES SMITH, Dayton, Ohio
ROY ELBERT SPEAR, Flint, Mich.
ARTHUR TAYLOR, Calipatria, Cal.
DAVID ALEXANDER WALLACE, Ottawa, Ont., Canada
JASPER DUDLEY WARD, Denver, Colo.
EDWARD WILLOUGHBY WENDELL, Hudson Falls, N. Y.

AS JUNIORS

ADOLFO RAMIREZ ARELLANO Y GONZALEZ DE MENDOZA, Havana,
Cuba
JOEL BEAN COX, Wailuku, Hawaii
ERNESTO GÓMEZ, Chicago, Ill.
HECTOR CLINTON GRISWOLD, Troy, N. Y.
ARTHUR EDWARD HALEY, Cotabato, Philippine Islands
CHARLIE WILLIAM HICKOK, Kansas City, Mo.
RAYMOND JOSEPH KEAYS, Poughkeepsie, N. Y.
ROLAND AUGUST MUENSTER, Austin, Tex.
BLAIR ARTHUR ROSS, Memphis, Tenn.
GEORGE HUTZE RUHLING, Flint, Mich.

The Secretary announced the transfer of the following candidates
on March 13th, 1917:

FROM ASSOCIATE MEMBER TO MEMBER

RALPH NORMAN BEGIEN, Baltimore, Md.
ERNEST BATEMAN BLACK, Kansas City, Mo.
GEORGE WILLIAM BURPEE, New York City
BORDEN BAKER HARRIS, New York City
STUART WILSON JACKSON, Pittsburgh, Pa.
JACOB LOEWENSTEIN, New York City
HENRY PEYTON MOBBERLY, Springfield, Mo.
STEPHEN ALLEN ROAKE, Bloomfield, Mo.
ARTHUR WINTHROP SARGENT, Seattle, Wash.
FRANK GEORGE WHITE, San Francisco, Cal.

FROM JUNIOR TO ASSOCIATE MEMBER

CHARLES WILBUR BANKS, Boston, Mass.
JOSEPH LAWRENCE BRENNAN, New York City
JOSEPH JENKS CHAMBERLAIN, Jr., East Cleveland, Ohio
EUGENE HUNTER COLEMAN, New Orleans, La.
CLARENCE WINSTON COOPER, Anniston, Ala.
EMIL FRANK CYKLER, Honolulu, Hawaii
DAVID METHENY DODDS, Kansas City, Mo.
KEYES CHRISTOPHER GAYNOR, Sioux City, Iowa
MORTIMER GRUNAUEB, New York City
GEORGE RAYMOND HAWES, Seattle, Wash.
BOYLE IRWIN, Narberth, Pa.
CARL HARMAN KNOETTGE, Ithaca, N. Y.
CHESTER BROOKS LEWIS, Ann Arbor, Mich.
ANTONIO SEBASTIAN LUCCHETTI-OTERO, San Juan, Porto Rico
SAMUEL ALEXANDER McWILLIAMS, Malta, Mont.
PERCY SHELLEY MONK, Chattanooga, Tenn.

HAROLD PERRINE, New York City
RALPH REGINALD RANDELL, Albuquerque, N. Mex.
JAMES RALPH SHIELDS, Berkeley, Cal.
RALPH ALCORN SMALLMAN, Birmingham, Ala.
HARRY HERMAN STEINHAUSER, Brooklyn, N. Y.
GEORGE BLANEY TAYLOR, New Britain, Conn.
CHARLES RANDOLPH THOMAS, Greenville, S. C.

The Secretary announced the following deaths:

WILLIAM DOUGLAS PICKETT, of Lexington, Ky., elected Member, July 6th, 1853; Honorary Member, April 1st, 1914; died March 5th, 1917.

WILLIAM HENRY BALDWIN, of Yonkers, N. Y., elected Member, June 6th, 1888; died March 6th, 1917.

DANIEL WHEELER BOWMAN, of Phoenixville, Pa., elected Member, December 3d, 1912; died March 13th, 1917.

GEORGE HENRY FROST, of Plainfield, N. J., elected Associate, January 4th, 1882; died March 15th, 1917.

Adjourned.

April 4th, 1917.—The meeting was called to order, in the Auditorium of the Engineering Building, at 8.30 P. M.; President George H. Pegram in the chair; Chas. Warren Hunt, Secretary; and present, also, about 610 members and guests.

The minutes of the meetings of February 21st and March 7th, 1917, were approved as printed in *Proceedings* for February, 1917.

Mr. John R. MacArthur, a member of the American Industrial Commission which visited France in 1916, addressed the Society on "France at Work and at War, as seen on a Recent Visit", illustrating his remarks with lantern slides and moving pictures.

At the conclusion of the address, and on motion duly seconded, three cheers were given for France.

Adjourned.

OF THE BOARD OF DIRECTION

(Abstract)

March 13th, 1917.—The Board met at 10.30 P. M., immediately after the adjournment of the Membership Committee; President Pegram in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Davies, Harwood, Noble, and Rights.

Ballots for membership were canvassed, resulting in the election of 19 Members, 51 Associate Members, and 10 Juniors, and the transfer of 23 Juniors to the grade of Associate Member.

Ten Associate Members were transferred to the grade of Member. A Report from the Membership Committee was received and acted upon.

Adjourned.

SOCIETY ITEMS OF INTEREST

UNITED ENGINEERING SOCIETY

Extracts from the Annual Report* of the President, Mr. Charles F. Rand.

The important fact of the year 1916 is that on July 25th contracts were executed by which the American Society of Civil Engineers became an additional Founder Society and arranged to make its permanent home in our building. The contracts provide for the construction of three additional stories to the building, the American Society to contribute a sum considered equivalent to what each other Founder Society had contributed and to participate in the original Carnegie gift and have an equal share in the property with each other Founder Society.

The construction of the addition to the building is under way, \$62 525.04 having been expended thereon in 1916.

This work is in charge of a Building Committee consisting of H. H. Barnes, Jr., Chairman, E. G. Spilsbury, Charles Warren Hunt, and Charles F. Rand.

At the request of the Founder Societies, important alterations were made to the lecture halls on the fifth floor of the building to make the same suitable for social functions of the societies.

The Library of the American Society is being merged with the Library of the U. E. S. and the other Founder Societies.

At the present time the membership of the four Founder Societies is 29 000 and of associate societies 23 000, so that a total of 52 000 engineers now have their headquarters in our building.

The building is at present fully occupied.

The value of the real estate now owned by this Society is \$1 647 171.16. This sum will be increased at the end of 1917 by the amount of the cost of the addition to the building.

The income of the Society during 1916 was.....\$53 062.03

The expenditure was..... 44 316.20

Gain for the year..... 8 745.83

Funds for the benefit of the Library were obtained during the year from contributions by the societies of Civil, Mining, Mechanical and Electrical Engineers and the United Engineering Society to the amount of.....\$15 542.33

From miscellaneous sources..... 1 751.03

The gross income from searches was..... 5 382.98

Total.....\$22 676.34

* This is a condensation from the Annual Report of the United Engineering Society, and contains matters which would seem to be of interest to the membership of the American Society of Civil Engineers.—Secretary.

The Library expenses have been as follows:

| | |
|--|-------------|
| Library books purchased..... | \$2 340.88 |
| Library binding expense..... | 1 442.55 |
| Library supplies and miscellaneous expenses..... | 1 379.38 |
| Library salaries..... | 10 923.81 |
| Library photostat..... | 1 091.02 |
| Library new lighting fixtures..... | 132.47 |
| Library searches expense..... | 5 366.23 |
| Total..... | \$22 676.34 |

Dr. James Douglas, who started our Library Endowment Fund with a gift of \$5 000, has added \$95 000 thereto. The total of the fund is now \$102 559.70. An effort is being made to materially increase this fund, as the Library requires the income of a million dollars for its proposed development.

The securities in the Engineering Foundation Fund were sold and the proceeds re-invested to produce a higher income, as shown in detail in the Treasurer's report. The Fund now amounts to \$203 374.80.

The general Reserve Fund remains unchanged at.....\$10 000.00

The Depreciation and Renewal Fund is now.....71 456.12

The Surplus Account, December 31st, 1916, is.....6 053.25

The John Fritz Medal

The attention of the membership is called to a very handsome book, recently published by the John Fritz Medal Board of Award, which gives a history of the medal, the rules of award, and biographical sketches of the medallists, each illustrated with a portrait. The book was designed to furnish information to engineers concerning this medal, the annual award of which is in the hands of a Board appointed by the four Founder Societies. It is not in any sense a commercial enterprise. Copies may be obtained by addressing the Secretary, John Fritz Medal Board of Award, Engineering Societies Building, 29 West 39th Street, New York City, the price being \$2.50 per copy.

Meeting for the Award of the John Fritz Medal for 1917

The John Fritz Medal for 1917, awarded to Professor Henry M. Howe for "his investigations in metallurgy and especially in the metallography of iron and steel," will be presented on Thursday, May 10th, 1917, at 8.30 P. M., in the Auditorium of the Engineering Building, 29 West 39th Street.

Dr. Ambrose Swasey, President of the John Fritz Medal Board of Award, will preside. Dr. Rossiter W. Raymond will speak on Professor Howe's achievements in metallography, and Professor Albert Sauveur and Judge Gary are also expected to address the meeting.

The members of this Society are invited to be present, and ladies also will be welcome.

ANNOUNCEMENTS

The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

FUTURE MEETINGS

May 2d, 1917.—8.30 P. M.—A regular business meeting will be held, and a paper by F. C. Carstarphen, Assoc. M. Am. Soc. C. E., entitled, "An Aerial Tramway for the Saline Valley Salt Company, Inyo County, California", will be presented for discussion.

This paper is printed in this number of *Proceedings*.

May 16th, 1917.—8.30 P. M.—At this meeting, a paper by John F. Partridge, Jun. Am. Soc. C. E., entitled "Modern Practice in Wood Stave Pipe Design and Suggestions for Standard Specifications", will be presented for discussion.

This paper is printed in this number of *Proceedings*.

ANNUAL CONVENTION

The Forty-ninth Annual Convention of the Society will be held in the "Twin Cities" of St. Paul and Minneapolis, Minn., from June 12th to 15th, 1917, inclusive.

The general arrangements for the Convention are in the hands of the following Committees:

Committee of the Board of Direction

W. L. DARLING, *Chairman*

F. G. JONAH

CHAS. WARREN HUNT

Local Committee

GEORGE L. WILSON, *Chairman*

R. B. C. BEMENT

A. F. MEYER

F. W. CAPPELEN

F. C. SHENEHON

OSCAR CLAUSSEN

H. E. STEVENS

WILLIAM DE LA BARRE

R. D. THOMAS

F. E. HOUSE

W. T. WALKER

W. H. HOYT

L. P. WOLFF

A circular giving information as to the general programme, transportation, hotel rates, etc., will be issued as soon as possible.

SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members who have made use of the resources of the Society in this manner, has been expressed frequently, and leaves little doubt that if it were generally known to the membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be performed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

It sometimes happens that references are found which are not readily accessible to the person for whom the search is made. In that case the material may be reproduced by photography, and this can be done for members at the cost of the work to the Society, which is small. This method is particularly useful when there are drawings or figures in the text, which would be very expensive to reproduce by hand.

A list of 989 bibliographies made in the Library, giving the cost of each, was published in Vol. LXXX of *Transactions*.

Since October 1st, 1916, the Library of the American Society of Civil Engineers has ceased to exist, as such, having been merged with the Libraries of the Mining, Mechanical, and Electrical Engineers, and become a part of the Library of the United Engineering Society. There were 67 000 accessions, which were not duplicates, turned over to that Library.

Hereafter, therefore, requests for searches should be addressed to the Librarian, United Engineering Society, 29 West 39th Street, New York City.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which, from their mathematical or technical nature, in the opinion of the Committee, are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions only will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

The Board of Direction has adopted rules for the preparation and presentation of papers, which will be found on page 429 of the August, 1913, *Proceedings*.

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Association, Organized 1905.

J. D. Galloway, President; E. T. Thurston, Secretary-Treasurer, 57 Post Street, San Francisco, Cal.

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Palace Hotel, on the third Tuesday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.30 P. M., every Wednesday, and the place of meeting may be ascertained by communicating with the Secretary.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

(Abstract of Minutes of Meeting)

February 20th, 1917.—The meeting was called to order at the Palace Hotel; President Galloway in the chair; E. T. Thurston, Secretary; and present, also, 78 members and guests.

Messrs. Rhodin, Bumsted, and Binkley were appointed as the Entertainment Committee for the April meeting.

The Secretary read a communication from Secretary Charles Warren Hunt announcing the approval by the Board of Direction of the amendments to Article IV, Sections 1 and 2, of the Constitution of the Association.

Attention was called to the movement to expedite the completion of the topographic map of the United States, and it was urged that engineers make individual efforts with members of the State Legislature to secure an increase in the amount appropriated for this purpose.

A communication from Secretary Hunt was read announcing the appointment of Messrs. Bontecou, McDonald, and Jonah, as a Committee of the Society to study the matter of the relations of Local Associations to the Society and to other local organizations and

clubs, and of the co-operation with such organizations in connection with local public affairs.

The Secretary was instructed to write to the Committee suggesting that it draw up a tentative set of rules for submission to the several Local Associations as a basis for discussion.

Mr. Edwin Duryea spoke briefly on the Annual Meeting of the Society and called attention to the proposed organization of The Engineering Council, under the auspices of The United Engineering Society, for the purpose of facilitating co-operation between the various engineering societies in discussing and acting on public questions.

President Galloway, for the Joint Committee on Military Affairs, reported that the preparation of a course of study had been delayed, but that a circular describing a course of study and lectures was nearly ready for distribution.

For the Committee appointed to investigate and report on the removal of Mr. Frickstad from a Civil Service position in Oakland, Mr. A. H. Markwart reported progress.

Mr. J. Newman, for the Committee on Civil Service, reported progress.

President Galloway called attention to the neglect on the part of the Association relative to one of its avowed objects, namely, the discussion of technical papers published by the Society, and appointed Messrs. Dewell, Griffin, Elliott, Drake, Frickstad, Tibbetts, Hawley, Markwart, and Saph, a Committee to report at the April meeting of the Association on the matter of forming sections for the consideration of such questions.

Attention was called to Assembly Bill 1126, before the State Legislature, relative to confining all building design and supervision to certificated architects. After discussion by Messrs. Couchot, Brunnier, Whitney, Leonard, Kriegsman, Markwart, Le Grand Brown, Wing, Rhodin, and Burrage, on motion, duly seconded, the President was instructed to appoint a committee of five with power to oppose and prevent the passage of such bill. The following Committee was appointed subsequently: Messrs. M. C. Couchot, Chairman, H. J. Brunnier, J. B. Leonard, W. L. Huber, and C. H. Snyder.

President Galloway read his Inaugural Address in which he discussed the extension of powers of government over industrial enterprises.

The address of the evening was delivered by Mr. Miner Chipman, of Boston, Mass., on "The Meaning of Efficiency."

Adjourned.

Colorado Association, Organized 1908.

Thomas W. Jaycox, President; L. R. Hinman, Secretary-Treasurer, 1400 West Colfax Avenue, Denver, Colo.

The meetings of the Colorado Association of Members of the American Society of Civil Engineers (Denver, Colo.) are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary. The meetings are usually pre-

ceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesdays at 12.30 P. M., at Daniel's and Fisher's.

Visiting members are urged to attend the meetings and luncheons.

(Abstract of Minutes of Meeting)

February 10th, 1917.—The meeting was called to order at the Denver Athletic Club; President Jaycox in the chair; L. R. Hinman, Secretary; and present, also, 24 members.

The minutes of the meeting of January 13th, 1917, were read and approved.

The resignation of Mr. S. B. Lamb was accepted with regret.

The Secretary announced the names of Messrs. Andrew Weiss and R. R. Palmer as new members.

A letter from Mr. Charles Warren Hunt, Secretary of the Society, relative to the co-operation of Local Associations with other organizations and clubs, was read by the Secretary and, on motion, duly seconded, was referred to the Committee on Co-operation.

The Secretary presented a letter from Director H. S. Crocker, reporting on the work done by the Colorado Committee of the Naval Consulting Board. The report was ordered placed on file.

The report of the Committee appointed to consult with Governor Gunter relative to the appointment of an Engineer on the State Public Utilities Commission was presented and, on motion, duly seconded, the report was accepted and the Committee discharged.

Reports were presented by four of the Technical Committees, appointed in January to abstract and report on papers or reports of the Special Committees of the Society, as published in December, 1916, *Proceedings*, as follows:

For the Technical Committee on Concrete, Mr. M. S. Ketchum presented an abstract of the Final Report of the Special Committee on Concrete and Reinforced Concrete (in the preparation of which he had been assisted by Mr. W. C. Huntington), and Messrs. Cerny and Jewett, of the Committee, discussed mixing, aggregate, etc., and the new requirements for cement tests, respectively. The whole subject was then discussed by Messrs. Miller, Crocker, Kauffman, and Reeve.

For the Committee on Conservation, Mr. W. B. Freeman presented an abstract of the Progress Report of the Special Committee on A National Water Law, and Chairman C. W. Comstock reported on the difficulties encountered by the original Committee in getting out its first report.

For the Structural Committee, Mr. A. N. Miller presented an abstract of the Progress Report of the Special Committee on Steel Columns and Struts, and the subject was discussed briefly by Mr. M. S. Ketchum.

For the Committee on Concrete, Mr. J. Y. Jewett presented an abstract of the paper "Tests of Concrete Specimens in Sea Water, at the Boston Navy Yard", by R. E. Bakenhus; M. Am. Soc. C. E. The paper was discussed briefly by Messrs. Cerny, Comstock, and Ketchum.

Owing to the lateness of the hour, the presentation of the report of the Committee on Roads and Highways, was postponed until a later meeting.

Adjourned.

Atlanta Association, Organized 1912.

Paul H. Norcross, President; Thomas P. Branch, Secretary-Treasurer, Georgia School of Technology, Atlanta, Ga.

The Association holds its meetings at the University Club, Atlanta, Ga. Regular monthly luncheon meetings are held to which visiting members of the Society are always welcome.

Baltimore Association, Organized 1914.

H. D. Bush, President; Charles J. Tilden, Secretary-Treasurer, The Johns Hopkins University, Baltimore, Md.

Cleveland Association, Organized 1914.

W. J. Watson, President; George H. Tinker, Secretary-Treasurer, Hickox Building, Cleveland, Ohio.

Detroit Association, Organized 1916.

T. A. Leisen, President; Secretary, Clarence W. Hubbell, 2334 Dime Bank Building, Detroit, Mich.

The regular meetings of the Association are held on the second Friday of December, April, and October, the last being the Annual Meeting.

District of Columbia Association, Organized 1916.

A. P. Davis, President; John C. Hoyt, Secretary-Treasurer, U. S. Geological Survey, Washington, D. C.

Illinois Association, Organized 1916.

C. F. Loweth, President, 4251 Vincennes Avenue, Chicago, Ill.

The regular meetings of the Association are held on the second Monday of March, June, September, and December, the last being the Annual Meeting. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary.

Louisiana Association, Organized 1914.

W. B. Gregory, President; Charles W. Okey, Secretary, Tulane University, New Orleans, La.

The regular meetings of the Association are held at The Cabildo, New Orleans, La., on the first Monday of January, April, July, and October.

Nebraska Association, Organized 1917.

Frank T. Darrow, President; Homer V. Knouse, Secretary-Treasurer, 115 City Hall, Omaha, Nebr.

Regular meetings of the Association are held on the first Saturday of each month, except July and August, and at such places as may be appointed from time to time by the Executive Committee. The

Annual Meeting is held in Lincoln, Nebr., on the second Friday in January.

It is probable that frequent luncheons will be held in Omaha, in addition to the monthly meetings, at which visiting members will be welcomed. The place of meeting may be ascertained by communicating with the Secretary.

Northwestern Association, Organized 1914.

George L. Wilson, President; Ralph D. Thomas, Secretary, 508 South First Street, Minneapolis, Minn.

Philadelphia Association, Organized 1913.

Samuel T. Wagner, President; C. W. Thorn, Secretary, 1313 South Broad Street, Philadelphia, Pa.

The regular meetings of the Association are held at the Engineers' Club of Philadelphia, 1317 Spruce Street, on the first Monday in January, April, and October, the last being the Annual Meeting.

Portland, Ore., Association, Organized 1913.

J. P. Newell, President; J. A. Currey, Secretary, 194 North 13th Street, Portland, Ore.

St. Louis Association, Organized 1914.

J. A. Ockerson, President; Gurdon G. Black, Secretary-Treasurer, 34 East Grand Avenue, St. Louis, Mo.

The meetings of the Association are held at the Engineers' Club Auditorium. The Annual Meeting is held on the fourth Monday in November. The time of other meetings is not fixed, but this information will be furnished on application to the Secretary.

San Diego Association, Organized 1915.

W. J. Gough, President; J. R. Comly, Secretary-Treasurer, 4105 Falcon Street, San Diego, Cal.

Seattle Association, Organized 1913.

Joseph Jacobs, President; Carl H. Reeves, Secretary-Treasurer, 441 Henry Building, Seattle, Wash.

The regular meetings of the Association are held at 12.15 p. m., on the last Monday of each month, at The Arctic Club.

(Abstract of Minutes of Meeting)

March 26th, 1917.—The meeting was called to order at the Arctic Club; President Jacobs in the chair; Carl H. Reeves, Secretary; and present, also, 24 members and guests.

The minutes of the meeting of February 26th, 1917, were read and approved.

Relative to the referendum ballot, as to the preference of the members in the matter of the monthly meetings, the Secretary-Treasurer reported that a total of 91 ballots had been mailed, and that the returns were as follows: In favor of a noon meeting with luncheon, 30; in favor of an evening meeting, with dinner, 17; in favor of a night meet-

ing, 7; and "no preference", 2. After a short discussion in reference to the luncheon, it was decided to hold the next meeting at the Frye Hotel.

The resignations of Messrs. H. M. Chittenden, W. F. Way, and A. V. Bouillon, as members of the Association, were presented. Those of Messrs. Way and Bouillon were accepted on account of their removal from the city, and, on motion, duly seconded, Mr. Chittenden was made an Honorary Member of the Association.

On motion, duly seconded, the Secretary-Treasurer was instructed to have printed and mailed to the membership a year book for 1917.

President Jacobs reported that, in accordance with instructions, he had taken up the matter of the relations of Local Associations and the Society with the Special Committee of the Society on that question, and his letter to Mr. Daniel Bontecou, Chairman of that Committee, was read.

In accordance with the action of the Association at its meeting of February 26th, 1917, the Committee on Relations with the Parent Society was continued and the following members were appointed: Messrs. A. H. Fuller, Chairman, E. B. Hussey, P. A. Franklin, A. S. Downey, and C. E. Fowler.

Mr. A. H. Fuller, having been appointed Chairman of the Committee on Relations with the Parent Society, was relieved from duty with the Legislative Committee, and Mr. L. M. Grant was appointed to succeed him on the latter Committee.

The Committee on Relations with the Parent Society, to which was submitted the matter of the Constitutional Amendment, as suggested by the St. Louis Association, reported that it agreed with the St. Louis Association that District No. 1 now had a disproportionately large representation on the Board of Direction, but that it did not concur with all the details of the changes proposed by the St. Louis Association. On motion, duly seconded, the report of the Committee was adopted.

A report on the National Engineering Council, referred to the Association by Mr. R. H. Thomson, and by the Association to its Committee on Relations with the Parent Society, was presented, and, on motion, duly seconded, after a general discussion of the subject, was adopted.

An invitation from Mr. Ernest B. Hussey, President of The Engineers' Club, for the Association to meet with the Club at its meeting of March 28th, 1917, was accepted by President Jacobs who expressed the appreciation of the Association for the courtesy.

Adjourned.

Southern California Association, Organized 1914.

H. Hawgood, President; Wilkie Woodard, Secretary, 435 Consolidated Realty Building, Los Angeles, Cal.

The Southern California Association of Members of the American Society of Civil Engineers (Los Angeles, Cal.) holds regular bi-monthly meetings, with banquet, at Hotel Clark, on the second Wednesday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained from the Secretary.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in Los Angeles, and any such member will be gladly welcomed as a guest at any of the meetings or luncheons.

Spokane Association, Organized 1914.

J. C. Ralston, President; B. J. Garnett, Secretary, City Hall, Spokane, Wash.

The regular meetings of the Association are held on the second Friday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary.

Visiting members are invited to attend the meetings and luncheons.

Texas Association, Organized 1913.

John B. Hawley, President; J. F. Witt, Secretary, Dallas, Tex.

Utah Association, Organized 1916.

E. C. La Rue, President; H. S. Kleinschmidt, Secretary-Treasurer, 306 Dooly Building, Salt Lake City, Utah.

MINUTES OF MEETINGS OF SPECIAL COMMITTEES

TO REPORT UPON ENGINEERING SUBJECTS

Special Committee on Stresses in Railroad Track

March 20th, 1917.—The meeting was called to order at the Congress Hotel, Chicago, Ill. Present, A. N. Talbot (Chairman), G. H. Bremner, John Brunner, W. J. Burton, C. D. Gennett, Jr. (representing Robert W. Hunt), Paul M. LaBach, C. G. E. Larsson, Albert Reichmann, and H. R. Safford.

The tentative mathematical analysis of the action of track under load, which had been sent out in advance by the Committee, was discussed.

The methods to be used in compiling a Progress Report were discussed, and the Chairman was authorized to appoint a sub-committee to aid in the arrangements for such report. Plans for the future work of the Committee were also discussed.

PRIVILEGES OF ENGINEERING SOCIETIES

EXTENDED TO MEMBERS OF THE

AMERICAN SOCIETY OF CIVIL ENGINEERS

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms, and at all meetings:

American Institute of Electrical Engineers, 25 West Thirty-ninth Street, New York City.

American Institute of Mining Engineers, 25 West Thirty-ninth Street, New York City.

American Society of Mechanical Engineers, 25 West Thirty-ninth Street, New York City.

Architekten-Verein zu Berlin, Wilhelmstrasse 92, Berlin W. 66, Germany.

Associação dos Engenheiros Cívis Portuguezes, Lisbon, Portugal.

Australasian Institute of Mining Engineers, Melbourne, Victoria, Australia.

Boston Society of Civil Engineers, 715 Tremont Temple, Boston, Mass.

Brooklyn Engineers' Club, 117 Remsen Street, Brooklyn, N. Y.

Canadian Society of Civil Engineers, 176 Mansfield Street, Montreal, Que., Canada.

Civil Engineers' Society of St. Paul, St. Paul, Minn.

Cleveland Engineering Society, Chamber of Commerce Building, Cleveland, Ohio.

Cleveland Institute of Engineers, Middlesbrough, England.

Dansk Ingeniørforening, Amaliegade 38, Copenhagen, Denmark.

Detroit Engineering Society, 46 Grand River Avenue, West, Detroit, Mich.

Engineers and Architects Club of Louisville, 1412 Starks Building, Louisville, Ky.

Engineers' Club of Baltimore, 6 West Eager Street, Baltimore, Md.

Engineers' Club of Kansas City, E. B. Murray, Secretary, 920 Walnut Street, Kansas City, Mo.

Engineers' Club of Minneapolis, 17 South Sixth Street, Minneapolis, Minn.

Engineers' Club of Philadelphia, 1317 Spruce Street, Philadelphia, Pa.

Engineers' Club of St. Louis, 3817 Olive Street, St. Louis, Mo.

Engineers' Club of Toronto, 96 King Street, West, Toronto, Ont., Canada.

Engineers' Club of Trenton, Trent Theatre Building, 12 North Warren Street, Trenton, N. J.

Engineers' Society of Northeastern Pennsylvania, 415 Washington Avenue, Scranton, Pa.

Engineers' Society of Pennsylvania, 31 South Front Street, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania, 2511 Oliver Building, Pittsburgh, Pa.

Institute of Marine Engineers, The Minories, Tower Hill, London, E., England.

Institution of Civil Engineers, Great George Street, Westminster, S. W., London, England.

Institution of Engineers of the River Plate, Calle 25 de Mayo 195, Buenos Aires, Argentine Republic.

- Institution of Naval Architects**, 5 Adelphi Terrace, London, W. C., England.
- Junior Institution of Engineers**, 39 Victoria Street, Westminster, S. W., London, England.
- Koninklijk Instituut van Ingenieurs**, The Hague, The Netherlands.
- Louisiana Engineering Society**, State Museum Building, Chartres and St. Ann Streets, New Orleans, La.
- Memphis Engineers' Club**, Memphis, Tenn.
- Midland Institute of Mining, Civil and Mechanical Engineers**, Sheffield, England.
- Montana Society of Engineers**, Butte, Mont.
- North of England Institute of Mining and Mechanical Engineers**, Newcastle-upon-Tyne, England.
- Oesterreichischer Ingenieur- und Architekten-Verein**, Eschenbachgasse 9, Vienna, Austria.
- Oregon Society of Civil Engineers**, Portland, Ore.
- Pacific Northwest Society of Engineers**, 312 Central Building, Seattle, Wash.
- Rochester Engineering Society**, Rochester, N. Y.
- Sachsischer Ingenieur- und Architekten-Verein**, Dresden, Germany.
- Sociedad Colombiana de Ingenieros**, Bogota, Colombia.
- Sociedad de Ingenieros del Peru**, Lima, Peru.
- Societe des Ingenieurs Civils de France**, 19 rue Blanche, Paris, France.
- Society of Engineers**, 17 Victoria Street, Westminster, S. W., London, England.
- Svenska Teknologforeningen**, Brunkebergstorg 18, Stockholm, Sweden.
- Tekniske Forening**, Vestre Boulevard 18-1, Copenhagen, Denmark.
- Vermont Society of Engineers**, George A. Reed, Secretary, Montpelier, Vt.
- Western Society of Engineers**, 1737 Monadnock Block, Chicago, Ill.

ACCESSIONS TO THE LIBRARY

(From March 7th to April 3d, 1917)

DONATIONS*

GOVERNMENT PARTNERSHIP IN RAILROADS.

By Mark Wymond. Cloth, 8 x 5½ in., 178 + 3 pp. Chicago, Wymond & Clark, 1917. (Donated by the Author.)

The purpose of this book, it is stated, is constructive suggestion in relation to the administration of the railroads. The author, therefore, begins by examining present conditions, in order, it is said, to determine what evils and defects exist in the present form of railroad regulation by Government and also in the administration of railroads by their officials, and thereby to suggest and devise new measures to improve the present unsatisfactory conditions. The Contents are: Our Transportation Problem; The Sins of Regulation; Sins of the Railroads; A Constructive Railroad Policy; Government Ownership of Railroads.

THE TRACKMAN'S HELPER:

A Hand Book for Track Foremen, Supervisors and Engineers. Revised and Enlarged by Richard T. Dana, M. Am. Soc. C. E., and A. F. Trimble, After the Original by J. Kindelan as Revised by F. A. Smith, F. R. Coates, and Jerry Sullivan. 1917 Edition. Cloth, 6½ x 4½ in., illus., 410 pp. New York, Clark Book Co., 1917. \$2.00.

The preface states that the object of this book is to help the trackman, by giving him, in the most convenient form, the practical results of observation and study of track work on the railroads of the United States for the last twenty years, together with the notes on the subject that were published in 1894 by the late Mr. J. Kindelan. The subject-matter, it is stated, has been re-written and greatly enlarged, and many new illustrations have been added in order to bring the volume up to date. The book, it is said, covers the principal field of a trackman's work and keeps strictly within it; it avoids elaborate theories, its language is readily understood, and it is small enough to be carried in the pocket. The Contents are: Construction; Spiking and Gaging; General Spring Work; Drainage; Summer Track Work; Cutting Weeds; Ballasting; Renewal of Rails; Effects of the Wave Motion of Rail on Track Rail Movements; General Fall Track Work; Building Fences; General Winter Work; Bucking Snow; Laying Out Curves; Elevation of Curves; Lining Curves; Special Conditions on Mountain Roads; Frogs and Switches; Use and Care of Track Tools; Tie Plates; Wrecking; General Instructions; Practical Hints for Trackmen; Index.

WHARVES AND PIERS:

Their Design, Construction, and Equipment. By Carleton Greene, M. Am. Soc. C. E. Cloth, 9½ x 6½ in., illus., 14 + 248 pp. New York, McGraw-Hill Book Company, Inc.; London, Hill Publishing Co., Ltd., 1917. \$3.00.

In this book, the author, it is stated, has endeavored to present a treatise on modern American practice in the design and construction of wharves, piers, pier sheds, and their equipment, including machinery for handling miscellaneous freight. Owing to the modern tendency to slight the advantages of timber construction for wharves, the author, it is said, has given particular attention to the principles and methods requisite for durability in wharf construction. In his descriptions of existing structures included in the text, the author, it is stated, has emphasized the particular conditions which had to be provided for in the design, the methods used in fulfilling the special requirements, and, to some extent, the reasons why particular types and details were adopted. The Contents are: Introduction; Primary Principles of Design; Details of Timber Construction; Retaining Walls for Piers and Marginal Wharves; Piers; Wharf and Pier Sheds; Equipment of Wharves and Piers; Cargo Handling Machinery; Appendix: Cost of Walls, Piers, Sheds, etc.; Index.

*Unless otherwise specified, books in this list have been donated by the publishers.

STRESSES IN STRUCTURAL STEEL ANGLES

With Special Tables. By L. A. Waterbury, M. Am. Soc. C. E. Cloth, $8\frac{1}{2} \times 5\frac{1}{2}$ in., illus., 5 + 77 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1917. \$1.25.

This volume, the preface states, has been prepared with the hope that it will serve to indicate the nature of important factors affecting the stresses in steel angles, which are not commonly considered in analyses made for the purposes of design, and also that it may furnish the means for their consideration in practice. The author states that the values of the products of inertia involved in the computation of bending stresses are not ordinarily included in structural handbooks, and, therefore, values of that element for commercial angles of 2 by 2 in., and larger, are given in Tables I and II of this book. The section modulus polygon is explained and values for commercial angles of 2 by 2 in., and larger co-ordinates for the vertices of the polygons, are given in Table III. End connections and their efficiency are also discussed, and, in Tables IV and V, are given values of efficiency, equivalent effective area, and total tension allowable for a maximum unit stress of 16 000 lb. per sq. in., computed in accordance with methods outlined in the text. The Contents are: Relation Between Bending Moment and Flexural Stress; Expressions for the Section Modulus; Product of Inertia; Section Modulus Polygons; Neutral Axis; Plane of Loading; Combined Stresses; Flexure for Angles in Pairs; Transfer of Stress by Shear to an Outstanding Leg; Efficiency of End Connections; Tables.

ELECTRIC AND MAGNETIC MEASUREMENTS.

By Charles Marquis Smith. Cloth, $8 \times 5\frac{1}{2}$ in., illus., 12 + 373 pp. New York, The Macmillan Company, 1917. \$2.40.

This book, it is stated, has been used and is intended as a textbook for students who have had one year of general physics and some knowledge of the calculus. The subject-matter, it is said, is a development of a course of lectures and laboratory notes on electric and magnetic measurements, and standard textbooks and treatises on that subject have also been used for additional material. The methods of measurement described are said to be the standard ones, with only such variations as have been found of value in practice, and the laboratory exercises included in the text do not necessitate, it is stated, any particular type of apparatus except those which are well known and available. Part III of the Appendix contains a list of standard reference books on the subject. The Chapter Headings are: Introduction; Galvanometers; Resistance and Its Measurement; Electromotive Force and Potential Difference; Electric Current; Capacity and the Condenser; Electromagnetic Induction; Electrical Quantity and the Ballistic Galvanometer; The Measurement of Capacity; The Measurement of Self and Mutual Inductance; Magnetism and the Magnetic Circuit; The Earth's Magnetism; Magnetic Testing; Appendix: Part I, Absolute Measurements; Part II, Tables; Part III, Standard Reference Books; Index.

REINFORCED CONCRETE DESIGN TABLES:

A Handbook for Engineers and Architects for Use in Designing Reinforced Concrete Structures. By M. Edgar Thomas and Charles E. Nichols. Morocco, $7 \times 4\frac{1}{2}$ in., illus., 8 + 208 pp. New York, McGraw-Hill Book Company, Inc.; London, Hill Publishing Co., Ltd., 1917. \$3.00.

This set of tables, it is said, cover a wide range of stresses and include those used by a majority of designers. No attempt has been made, it is stated, to influence or to restrict the designer's ideas, and, therefore, the tables can be applied to the design of any reinforced concrete structure and can also be used as a quick and independent check on any other set of curves or tables used by the designer. As they can be readily found elsewhere, tables for various conditions of loadings, spans, etc., as well as tables of logarithms, squares, and cubes of numbers, have been omitted in this volume. The tables herein presented were started, it is stated, by the authors ten years ago and have been added to from time to time as their work required more varied unit stresses. They have the added value to the designer, therefore, of having been tried out in actual practice and of being the results of some years of development. The Contents are: Notation and Formulae; Explanation of Tables; Tables of Coefficients for Slabs and Simple Beams; Logarithmic Curves; Table of Bending Moments and Shear for Continuous Beams; Weights, Areas and Spacing of Bars; Weights of Concrete Members in Pounds; Tables of Slabs and

Simple Beams; Tables of Tee Beams; Tables of Beams with Compression Reinforcement; Square Columns; Hooped Columns; Hooped Column Reinforcement; Vertical Column Reinforcement; Spacing and Percentages of Column Hooping; Tables of Weights, Areas and Spacing of Bars.

THE SUBMARINE TORPEDO BOAT:

Its Characteristics and Modern Development. By Allen Hoar, Jun. Am. Soc. C. E. Cloth, 8 x 5½ in., illus., 9 + 211 pp. New York, D. Van Nostrand Company, 1916. (Donated by the Author.)

The preface states that it has been the author's purpose, in writing this volume, to place before the public a book which will be of interest to the general reader and of value to the technical man and naval engineer who has not specialized in this line. To that end, he has discussed, it is said, in non-technical language, the inherent characteristics of the submarine boat, the problems involved in its design and construction, the difficulties of operation, its present limitations, and its future possibilities. The Contents are: Early History and Development; Development of the Present-Day Submarine; Characteristics and Requirements; Types of Submarines; Design of the Submarine Torpedo Boat; The Power Plant; Future Development; Means of Defense Against Submarine Attack; Tactical Evolutions of the Submarine; The Torpedo; Tenders and Salvage Ships; List of Accidents; Submarine Mines; Appendix I, List of Submarines in the Principal Navies; Index.

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SUMMARY OF ACCESSIONS

(From March 7th to April 3d, 1917)

Donations (including 7 duplicates)..... 243

MEMBERSHIP

(From March 9th to April 5th, 1917)

ADDITIONS

| MEMBERS | | Date of Membership. |
|--|-------------------------|---|
| BOWIE, WILLIAM. Chf. of Div. of Geodesy, U. S. Coast and Geodetic Survey, Washington, D. C..... | | Mar. 13, 1917 |
| BURPEE, GEORGE WILLIAM. With Westing- house, Church, Kerr & Co., 37 Wall St., New York City..... | Jun. Assoc. M. M. | Sept. 3, 1907 Sept. 5, 1911 Mar. 13, 1917 |
| CHASE, GUY HERBERT. Commr., Dept. of Streets and Eng.; Member, Municipal Development Comm., 470 Main St., Fitchburg, Mass..... | | Mar. 13, 1917 |
| CONANT, ELBRIDGE ROBBINS. Chf. Engr. and Purchasing Officer, City of Savannah, City Hall, Savannah, Ga.. | | Mar. 13, 1917 |
| FLAGLER, CLEMENT ALEXANDER FINLEY. Lt.-Col., Corps of Engrs., U. S. A., in Chg., Washington Engr. Dist., 305 Southern Bldg., Washington, D. C..... | | Mar. 13, 1917 |
| HARRIS, BORDEN BAKER. Associated with F. A. } Molitor, 35 Nassau St., New York City.. } | Assoc. M. M. | April 3, 1907 Mar. 13, 1917 |
| HARTBRIDGE, ALFRED LAMAR. Constr. Engr. and Asst. to Asst. Const. Mgr., Stone & Webster Eng. Corpora- tion, 147 Milk St., Boston, Mass..... | | Mar. 13, 1917 |
| HENDRICKS, ERNEST DEMAREST. Res. Engr., Residency No. 3, New York State Barge Canal, Fort Plain, N. Y... | | Mar. 13, 1917 |
| HOLBY, FRANK AVIL. 222 Lexington Ave., Dayton, Ohio.. | | Mar. 13, 1917 |
| HUTCHINSON, FRANK. Chf. Engr., Pittsburgh Steel Ore Co., Riverton, Minn..... | | Mar. 13, 1917 |
| JACKSON, STUART WILSON. Asst. Engr., State Highway Dept., 904 Hartje Bldg., Pitts- burgh, Pa..... | Assoc. M. M. | April 4, 1911 Mar. 13, 1917 |
| KEYSER, CHARLES PAUL. Engr., Parks and Boulevards, City of Portland, 1147 East Yamhill St., Portland, Ore..... | | Mar. 13, 1917 |
| LOEWENSTEIN, JACOB. With Am. Bridge Co., 30 Church St. (Res., 2 West 94th St.), New York City..... | Assoc. M. M. | Feb. 6, 1907 Mar. 13, 1917 |
| MILLER, RICHARD LEVI. Contr. Engr. (Miller & Borch- ding), 3806 Arsenal St., St. Louis, Mo..... | | Mar. 13, 1917 |
| MOBBERLY, HENRY PEYTON. Cons. Engr., 1121 East Elm St., Springfield, Mo..... | Assoc. M. M. | April 3, 1907 Mar. 13, 1917 |
| MOULTON, HERBERT GEORGE. Cons. Engr., 14 Wall St., New York City..... | | Mar. 13, 1917 |
| NOYES, ARTHUR PAGE. 55 Buena Vista Terrace, San Fran- cisco, Cal..... | | Sept. 12, 1916 |

| MEMBERS (Continued) | | Date of Membership. |
|---|-------------------|---------------------|
| PHELPS, HOWARD EASTWOOD. Asst. Prof. of Civ. Eng., Univ. of Colorado; Cons. Engr., 925 Grant Pl., Boulder, Colo.... | } Assoc. M. M. | Jan. 7, 1913 |
| | | Jan. 16, 1917 |
| POWELL, CHARLES UNDERHILL. Engr. in Chg., Queens Topo- graphical Bureau, Broadway and Sanford Ave., Flushing, N. Y..... | | Mar. 13, 1917 |
| ROAKE, STEPHEN ALLEN. Chf. Draftsman, Cel- luloid Co., 1 Winsor Pl., Bloomfield, N. J..... | } Assoc. M. M. | June 6, 1911 |
| | | Mar. 13, 1917 |
| SARGENT, ARTHUR WINTHROP. U. S. Asst. Engr., P. O. Box 1809, Seattle, Wash.. | } Assoc. M. M. | Sept. 6, 1905 |
| | | Mar. 13, 1917 |
| THOMSON, WILLIAM STEWART. Chf. Engr., Corrugated Bar Co., 509 Mutual Life Bldg., Buffalo, N. Y..... | | Mar. 13, 1917 |
| VAUGHAN, JOHN FAIRFIELD. Cons. Engr., 185 Devonshire St., Boston, Mass..... | | Mar. 13, 1917 |

ASSOCIATE MEMBERS

| | | |
|--|-----------------------|---------------|
| ALLEN, RALPH BENJAMIN. Asst. to William Russell Davis, 311 Arkay Bldg., Albany, N. Y..... | | Mar. 13, 1917 |
| ATKINSON, ARTHUR GARRATT. Care, California Highway Comm., Willits, Cal..... | | Mar. 13, 1917 |
| BANKS, CHARLES WILBUR. 24 Queensbury St., Boston, Mass..... | } Jun. Assoc. M. | Feb. 5, 1907 |
| BENNETT, MANCHE OWEN. Asst. Engr., Oregon State High- way Comm., Pendleton, Ore..... | | Mar. 13, 1917 |
| BLANCHARD, ROLLO KIMBALL. Mech. Engr. and Asst. to Pres., Neptune Meter Co., 50 East 42d St., New York City..... | | Mar. 13, 1917 |
| BLECH, EDWARD SORREL. Civ. Engr., Soledad Sugar Co., Cienfuegos, Cuba..... | | Mar. 13, 1917 |
| BURNETTE, GEORGE HARLEY. Asst. Engr., Monongahela Ry., Box 697, Brownsville, Pa..... | | Mar. 13, 1917 |
| BUXTON, EDWIN WALKER. 4108 Virginia Ave., Kansas City, Mo..... | | Mar. 13, 1917 |
| CARRINGTON, HENRY. Chf. Engr., Freeport & Mexican Fuel Oil Corporation, 3 ^a Calle de las Damas 68 A, Tam- pico, Tamaulipas, Mexico..... | | Mar. 13, 1917 |
| CARSON, WILLIAM FRANKLIN. Designing Engr., P. M. Sax, 327 West Logan St., Philadelphia, Pa..... | | Mar. 13, 1917 |
| CHAMBERS, CLOYDE CLEAVER. Asst. Engr., The Miami Con- servancy Dist., Dayton, Ohio..... | | Mar. 13, 1917 |
| COLEMAN, EUGENE HUNTER. (J. F. Coleman Eng. Co.), 921 Hibernia Bldg., New Orleans, La..... | } Jun. Assoc. M. | Oct. 1, 1913 |
| | | Mar. 13, 1917 |

ASSOCIATE MEMBERS (*Continued*)

| | | Date of Membership. |
|---|-----------|------------------------|
| COOPER, CLARENCE WINSTON. Contr. Engr., | Jun. | Mar. 4, 1914 |
| Box 368, Anniston, Ala. | Assoc. M. | Mar. 13, 1917 |
| CORKRAN, WILBUR SHERMAN. Engr. with Portland Cement | | |
| Assoc., 507 Washington St., Wilmington, Del. | | Mar. 13, 1917 |
| CRANE, ALBERT ELL. Supt. of Constr., The Whitney Co., | | |
| 757 Broad St., Augusta, Ga. | | Mar. 13, 1917 |
| DE LARA, FRANK BELASCO. Care, Standard Oil Co. of New | | |
| York, Batavia, Java. | | Oct. 10, 1916 |
| DODDS, DAVID METHENY. Squad Foreman, | Jun. | Nov. 1, 1910 |
| Kansas City Terminal Ry. (Res., 3912 | Assoc. M. | Mar. 13, 1917 |
| Bellevue Ave.), Kansas City, Mo. | | |
| EDWARDS, GUY BANKER. Res. Engr., Cleveland & Youngs- | | |
| town R. R., 2329 Broadway, Cleveland, Ohio. | | Mar. 13, 1917 |
| FASSETT, EARLE WALKER. U. S. Junior Engr., 723 Central | | |
| Bldg., Los Angeles, Cal. | | Mar. 13, 1917 |
| GOLDEN, WILLIAM ANTHONY. Asst. Engr., Rap. Trans. Sub- | | |
| way Constr. Co., 1241 Tinton Ave., New York City. | | Mar. 13, 1917 |
| HAUSER, KENNETH DOUGLASS. Multnomah Hotel, Port- | | |
| land, Ore. | | Mar. 13, 1917 |
| HAWES, GEORGE RAYMOND. 1212 Standard | Jun. | May 28, 1912 |
| Bank Bldg., Vancouver, B. C., Canada. | Assoc. M. | Mar. 13, 1917 |
| HELLYER, HENRY AMYATT CHAUNDY. Borough Engr., Ber- | | |
| genfield; Engr. and Mgr., Tenafly Lumber Co., | | |
| Tenafly, N. J. | | Mar. 13, 1917 |
| IRWIN, BOYLE. Structural Engr., Cramp & | Jun. | Aug. 31, 1915 |
| Co., Box 950, Narberth, Pa. | Assoc. M. | Mar. 13, 1917 |
| KERR, RAYMOND EARL. Gen. Mgr. and Chf. Engr. for | | |
| Receiver, Morgantown & Wheeling Ry., Morgan- | | |
| town, W. Va. | | Mar. 13, 1917 |
| KETCHAM, VALENTINE ODELL. Engr. in Chg. of Constr., | | |
| Deep Water Point Plant of E. I. du Pont de Nemours, | | |
| 1018 Trenton Pl., Wilmington, Del. | | Mar. 31, 1917 |
| KINNE, CHARLES COMFORT. 340 Leader Bldg., Cleveland, | | |
| Ohio. | | Jan. 15, 1917 |
| KITCHEN, ERNEST. St. James Hotel, Anderson, S. C. | | Mar. 13, 1917 |
| LEWIS, CHESTER BROOKS. Supt., Albert Kahn, | Jun. | Nov. 5, 1907 |
| Constr. Office, Univ. Library, Ann | Assoc. M. | Mar. 13, 1917 |
| Arbor, Mich. | | |
| LITTLE, WALTER COLTON, JR. Res. Engr., California High- | | |
| way Comm., San Luis Obispo, Cal. | | Mar. 13, 1917 |
| LORD, ARTHUR RUSSELL. Cons. Testing and Structural | | |
| Engr., 332 South Michigan Ave., Chicago, Ill. | | Mar. 13, 1917 |
| LUEDKE, ARTHUR LOUIS. Engr.-Economist, U. S. Office of | | |
| Public Roads, 1312 L St., N. W., Washington, D. C. | | Mar. 13, 1917 |
| LUZZATTO, JOSEPH GIOVANNI. 46 West 83d St., New York | | |
| City. | | Mar. 13, 1917 |

ASSOCIATE MEMBERS (*Continued*)

| | Date of Membership. | |
|---|------------------------|--------------------------------|
| LYNCH, JOHN FRANCIS. Contr. Engr. (Palmer & Lynch), P. O. Box 4, West Haven, Conn..... | Nov. | 28, 1916 |
| MCCONNELL, EDWARD HERBERT. 530 Fourteenth Ave., S. W., Roanoke, Va..... | Mar. | 13, 1917 |
| MCWHORTER, ROGER BARTON. With Miami Conservancy Dist., Miami Conservancy Bldg., Dayton, Ohio..... | Mar. | 13, 1917 |
| MCWILLIAMS, SAMUEL ALEXANDER. Asst. } Engr., U. S. Reclamation Service, Mit- } chell, Nebr..... } | Jun. } Assoc. M. } | Oct. 3, 1911 Mar. 13, 1917 |
| MADDOX, LUTHER ROBINSON. Junior Engr., Div. of Valua- tion, Interstate Commerce Comm., Chattanooga, Tenn. | Mar. | 13, 1917 |
| MAUL, THEODORE RUSSELL. Supt. of Constr., U. S. Public Bldgs., U. S. Treasury Dept., 413 Post Office Bldg., Philadelphia, Pa..... | Mar. | 13, 1917 |
| METCALFE, ALFRED HAROLD. Chf. Engr., A. Friederich & Sons Co., 304 Frank St., Rochester, N. Y..... | Mar. | 13, 1917 |
| MEYER, CHARLES LOUIS. Pres. and Gen. Mgr., Concrete Eng. Co., 612 Omaha National Bank Bldg., Omaha, Nebr..... | Mar. | 13, 1917 |
| MONK, PERCY SHELLEY. Structural Engr., } Interstate Commerce Comm., Div. of } Valuation, Chattanooga, Tenn..... } | Jun. } Assoc. M. } | June 30, 1911 Mar. 13, 1917 |
| MORIARTY, CLARENCE. (Taylor & Moriarty), 600 United Bank Bldg., Sioux City, Iowa..... | Mar. | 13, 1917 |
| PONZER, KARL LEWIS. (Parkes Eng. Co.), 203 } Citizens Bank Bldg., Pine Bluff, Ark... } | Jun. } Assoc. M. } | Dec. 3, 1912 Oct. 10, 1916 |
| RANDELL, RALPH REGINALD. Dist. Engr., U. S. } Forest Service, Albuquerque, N. Mex.. } | Jun. } Assoc. M. } | Oct. 1, 1912 Mar. 13, 1917 |
| RIEXINGER, HENRY EDWARD. Chf. Engr., International Ry., 204 Richmond Ave., Buffalo, N. Y..... | Mar. | 13, 1917 |
| SEXTON, JOHN RODEWICK. Div. Engr., Erie R. R., Supt.'s Office, Meadville, Pa..... | Mar. | 13, 1917 |
| SHEARER, DAVID McDOUGALD. Junior Engr. under Missis- sippi River Comm. and U. S. War Dept., P. O. Box 404, Vicksburg, Miss..... | Oct. | 10, 1916 |
| SMITH, VICTOR CHARLES. County Surv., Montgomery County (Res., 51 Oxford Ave.), Dayton, Ohio..... | Mar. | 13, 1917 |
| STEINHAUSER, HARRY HERMAN. Engr. and } Asst. Supt., Dock Contractor Co., 559 } East 26th St., Brooklyn, N. Y..... } | Jun. } Assoc. M. } | Feb. 4, 1913 Mar. 13, 1917 |
| STEVENSON, ERVIN BEECHER. Deputy City } Engr., City Hall, Albany, N. Y..... } | Jun. } Assoc. M. } | Jan. 31, 1911 Oct. 10, 1916 |
| TAYLOR, ARTHUR. With J. C. Allison, 209 Anderson Bldg., Callexico, Cal..... | Mar. | 13, 1917 |

ASSOCIATE MEMBERS (Continued)

| | | Date of Membership. |
|---|---|------------------------|
| TAYLOR, GEORGE BLANEY. Designing Engr., | } Jun. May 3, 1910 } Assoc. M. Mar. 13, 1917 | |
| Berlin Constr. Co., Berlin (Res., 96 | | |
| Harrison St., New Britain), Conn.... | | |
| THOMAS, CHARLES COFRAN HUBBARD. Superintending | | |
| Engr., Associated Pipe Line Co., 1012 Lassen St., | | |
| Berkeley, Cal..... | | Jan. 15, 1917 |
| THOMAS, CHARLES RANDOLPH. 600 Perry | } Jun. April 1, 1914 } Assoc. M. Mar. 13, 1917 | |
| Ave., Greenville, S. C..... | | |
| TUCKER, JAMES IRWIN. Prof., Civ. Eng.; Director of | | |
| School, Univ. of Oklahoma; Cons. State Engr., Okla- | | |
| homa Dept. of Highways, Norman, Okla..... | | Nov. 28, 1916 |
| WELLER, JOHN HENRY. Asst. Mgr., The New Trinidad Lake | | |
| Asphalt Co., Brighton, Trinidad..... | | Jan. 15, 1917 |
| WENDELL, EDWARD WILLOUGHBY. With New York State | | |
| Highway Comm., Catherine St., Hudson Falls, N. Y. | | Mar. 13, 1917 |

JUNIORS

| | | |
|--|--|---------------|
| ARELLANO Y GONZALEZ DE MENDOZA, ADOLFO RAMIREZ. | | |
| Gen. Contr., Cuba 50, Havana, Cuba..... | | Mar. 13, 1917 |
| GRISWOLD, HECTOR CLINTON. Care, The Texas Oil Co., | | |
| Marcus Hook, Pa..... | | Mar. 13, 1917 |
| PICKUS, JOSEPH. (Pickus Eng. & Constr. Co.), Sioux City, | | |
| Iowa..... | | Jan. 15, 1917 |
| REYNOLDS, RALPH WHITNEY. 2248 Telegraph Ave., Berke- | | |
| ley, Cal..... | | Nov. 28, 1916 |
| ROSS, BLAIR ARTHUR. Care, U. S. Engr. Office, Memphis, | | |
| Tenn..... | | Mar. 13, 1917 |
| RUHLING, GEORGE HUTZE. 915 East 7th St., Flint, Mich.. | | Mar. 13, 1917 |

CHANGES OF ADDRESS

MEMBERS

| | |
|--|--|
| AUS, GUNVALD. Cons. Engr., Volden, Asker pr., Christiania, Norway. | |
| BABB, CYRUS CATES. Cons. Hydr. Engr., Rhodhiss, N. C. | |
| BERLE, KORT. Cons. Engr., 244 Madison Ave., New York City. | |
| BLANCHARD, ARTHUR CLARENCE DOUGLAS. Care, The Hydro-Elec. Power | |
| Comm. of Ontario, 251 Main St., Niagara Falls, Ont., Canada. | |
| BRODIE, ORRIN LAWRENCE. Asst. Engr., Office of Cons. Engr., Pres., Borough | |
| of Manhattan, Room 2143, Municipal Bldg., New York City. | |
| BRYANT, BYRON HARKNESS. 1301 Twenty-first St., N. W., Washington, D. C. | |
| CRESSON, BENJAMIN FRANKLIN, JR. Cons. Engr., New Jersey State Board | |
| of Commerce and Navigation, 75 Montgomery St., Jersey City, N. J. | |
| DENT, ELLIOTT JOHNSTONE. Maj., Corps of Engrs., U. S. A., Couch Bldg., | |
| Portland, Ore. | |
| EVANS, LOUIS HYDE. Cons. Engr., Mast Hope, Pa. | |

MEMBERS (*Continued*)

- FERGUSON, JOHN NEIL. Care, Comm. on Waterways and Public Lands, State House, Boston, Mass.
- FITCH, SQUIRE EARNEST. Res. Engr., New York State Dept. of Highways, Hornell, N. Y.
- FRIES, AMOS ALFRED. Maj., Corps of Engrs., U. S. A., Yellowstone Park, Wyo.
- FULLER, WILLIAM BARNARD. Cons. Engr., Pierreville, Que., Canada.
- HARPER, EDGAR AMBLER. 839 Lathrop Bldg., Kansas City, Mo.
- HARRISON, CHRISTOPHER. Town Engr., Montclair, N. J.
- HEDKE, CHARLES RICHARD. Supt. of Irrig., Costilla Estates Development Co., Joliet, Mont.
- HOLTZMAN, STEPHEN FORD. 244 Madison Ave., New York City (Res., Hastings-upon-Hudson, N. Y.).
- HORTON, THEODORE. Chf. Engr., State Dept. of Health, 206 Lancaster St., Albany, N. Y.
- HOWELL, GEORGE PIERCE. Lt.-Col., Corps of Engrs., U. S. A., Bankers Trust Bldg., Little Rock, Ark.
- JAMES, WILLIAM ATLEE. Div. Engr. of Constr., C. P. Ry., 6a Pasadena Court, Winnipeg, Man., Canada.
- JOHANNESSEN, SIGVALD. Asst. Engr., I. R. T. Co., 188 Bellevue Ave., Upper Montclair, N. J.
- KASTL, ALEXANDER HOWARD. Cons. Engr., Chillicothe, Ill.
- LATHROP, JAY COWDEN. Contr. Engr., 2503 Union Central Bldg., Cincinnati, Ohio.
- McFETRIDGE, WILLIAM SUTTON. Valuation Engr., B. & L. E. R. R. (Res., 10 North Main St.), Greenville, Pa.
- McKIM, ALEXANDER RICE. New York State Insp. of Docks and Dams, 110 Washington Ave., Albany, N. Y.
- McREYNOLDS, ORVAL OMAR. Cons. Engr.; Field Supt., United States Petroleum Co., P. O. Box 206, Rawlins, Wyo.
- MINNISS, GEORGE STEWART. 291 Porter Ave., Buffalo, N. Y.
- NEWMAN, JEROME. Cons. Engr., 260 California St., San Francisco, Cal.
- PEARL, JAMES WARREN. 6000 South Sawyer Ave., Chicago, Ill.
- PEASE, FLOYD ODELL. Raymondville, Tex.
- REYNOLDS, ABRAHAM MOREAU. Engr. and Supt., Essex County Park Comm., 115 Clifton Ave., Newark (Res., Glen Ridge), N. J.
- ROWELL, GEORGE FREEMAN. Res. Engr., Day & Zimmermann, 913 State St., Erie, Pa.
- SCHLECHT, WALTER WILLIAM. Care, U. S. Reclamation Service, Yuma, Ariz.
- SHERRON, GEORGE AUSTIN. Engr., Portland Cement Assoc., 1016 South Oxford Ave., Los Angeles, Cal.
- SHMELEFF, THEODOR SEMENOVITCH. Novorossiisk, Caucasus, Russia.
- STEECE, EMMET ABNER. Supt. of Constr., Federal Bldgs., Nashville, Tenn.

MEMBERS (Continued)

- STURTEVANT, CARLTON WILLIAM. Gen. Supt., James Stewart & Co., Inc.,
P. O. Drawer No. 56, Troy, N. Y.
- TINKER, GEORGE HENRY. Bridge Engr., N. Y. C. & St. L. R. R., 516 Colum-
bia Bldg., Cleveland, Ohio.
- TRUMBULL, MORRIS KINNARD. Vice-Pres., National Lumber & Creosoting
Co., 1517 Commerce Bldg., Kansas City, Mo.
- VREDENBURGH, WATSON. Member of Firm, Hildreth & Co., 15 Broad St.,
New York City.
- WARD, THOMAS ROBERT JOHN. Insp. Gen. of Irrig. in India, Delhi, India.
- WESTON, CHARLES VALENTINE. Cons. Engr., 332 South Michigan Ave.,
Room 1547 (Res., 934 Lincoln Parkway), Chicago, Ill.
- WOOD, GEORGE PILLSBURY. 217 Walnut St., Peekskill, N. Y.

ASSOCIATE MEMBERS

- ABRAMS, SYLVAIN SELIC. Care, Am. Photo Player Co., Bonar and Addison
Sts., Berkeley, Cal.
- ARCHER, AUGUSTUS ROWLEY. Care, Norman McLeod, Ltd., Kent Bldg., To-
ronto, Ont., Canada.
- ASHLEY, CARL. 14 West 107th St., New York City.
- BAILEY, ALBERT ROSS. 5 West 129th St., New York City.
- BARTHOLOMEW, HERBERT. 618 East Miller St., Elmira, N. Y.
- BINFORD, CHARLES MUNNERLYN. Asst. Mgr., Elkhorn Piney Coal Min. Co.,
Stanaford, W. Va.
- BLAAUW, GEERT. Care, Fargo Eng. Co., Jackson, Mich.
- BORTIN, HARRY. Cons. Valuation Engr., 149 Broadway, New York City.
- BRADBURY, ROYALL DOUGLAS. Mgr., Structural Products Dept., Clinton
Wire Cloth Co., 508 Sears Bldg., Boston, Mass.
- BRAINARD, NORMAND DAGGETT. Gen. Supt., The Austin Co., 744 Roland
Ave., Baltimore, Md.
- BROWN, ARCHIBALD ALEXANDER. Engr., California & Hawajian Sugar Re-
fining Co., 2731 Forest Ave., Berkeley, Cal.
- BROWN, GROVER CHARLES. 55 Venango St., Johnstown, Pa.
- BUELL, WILLIAM ELIJAH, JR. Asst. Engr., Ambursen Hydr. Constr. Co. of
Canada, Ltd., and Raymond Concrete Pile Co., Ltd., 811 Central
Bldg., Seattle, Wash.
- BURBOURGS, FREDRIC SIDNEY. Care, Harris Forbes & Co., 56 William St.,
New York City.
- CHEVALIER, WILLARD TOWNSHEND. With Am. Bitumastic Enamels Co., 17
Battery Pl., New York City.
- CLAFLIN, FRED WINSLOW. Room 238, Queens Hotel, Toronto, Ont., Canada.
- COLLINS, JOHN T. Gen. Mgr., Dominican Govt. Rys., P. O. Box 25, Puerto
Plata, Dominican Republic.
- COLTMAN, ROBERT, JR. Structural Engr., Lewis A. Riley, 103 Park Ave.,
Room 607, New York City.
- CRITES, GEORGE SOLOMON. Asst. Div. Engr., B. & O. R. R., Flora, Ill.

ASSOCIATE MEMBERS (*Continued*)

- DAUGHERTY, HENRY MICHAEL. Asst. Engr., Chile Exploration Co., Tocopilla, Chile.
- DAVIES, JOHN PERCIVAL. Office Engr., Honolulu Iron Works Co., Woolworth Bldg., New York City.
- DAVIS, MEYER. Dist. Mgr., Asbestos Protected Metal Co., Hobart Bldg., San Francisco, Cal.
- DENNIS, THOMAS HENRY. Res. Engr., California Highway Comm., Modesto, Cal.
- DERRICK, JOHN RUSSELL. Asst. Res. Engr., M. of W., N. & W. Ry., Buena Vista, Va.
- DIGNUM, HARRY JOCELYN. Care, United Fruit Co., Port Antonio, Jamaica.
- DODGE, FRANK EARLE. Asst. Supt., Cia. Argentina de Cemento Portland, 46 Reconquista, Buenos Aires, Argentine Republic.
- DUNN, BEVERLY CHARLES. U. S. Engr. Office, Custom House Bldg., New Orleans, La.
- EDGERTON, GLEN EDGAR. Capt., Corps of Engrs., U. S. A., 2d U. S. Engrs., El Paso, Tex.
- EGENHOFF, ROWLAND LEONARD. Junior Engr., U. S. Engr. Office, 628 Jean St., Oakland, Cal.
- ELY, GEORGE WELLS, JR. Care, The Foundation Co., Norfolk, Va.
- FORSYTH, HAROLD FREDERICK. Anaconda, Mont.
- FOUGNER, NICOLAY KNUDTZON. Managing Director, Fougner's Staal-Beton Skibsbbygningsskorporation A/S, Sjøfartsbygningen, Christiania, Norway.
- GEORGE, SIDNEY HOWARD. Asst. Engr., C. & M. & St. P. Ry., 5005 Glenwood Ave., Chicago, Ill.
- GIESTING, FRANK ALEXANDER. Care, A. C. Vanderpoel, 18 Broadway, New York City.
- GRIMES, JAMES EDWARD. 5921 Magnolia St., Chicago, Ill.
- GUISSINGER, JOHN ADAMS. Eng. Dept., Mo. Pac. Ry., Ry. Exchange Bldg., St. Louis, Mo.
- HOCKLEY, CLAUDE CLEMENT. Chf. Engr., Thilmany Pulp & Paper Co., Kaukauna, Wis.
- HOPKINS, CHARLES ARCHER. Asst. Engr. on Valuation, C. & M. & St. P. Ry., Meeker, Colo.
- HOWLAND, LEON DAVID. Constr. Engr., Great Western Electro-Chemical Co., Pittsburg, Cal.
- HUBBARD, DANIEL. Asst. Div. Engr., B. & O. R. R., Garrett, Ind.
- HURLBUT, HINMAN BARRETT. Cons. Engr., Munsey Bldg., Washington, D. C.
- JOHNSON, ALEXANDER. 259 Brook Ave., Passaic, N. J.
- JORDAN, LEONARD CROUCH. With Westinghouse, Church, Kerr & Co.; Res., Morsemere, N. J.
- KEENE, WILLIAM ARCHIBALD, JR. 1204 East 59th St., Kansas City, Mo.
- KOHL, ERNEST WILLIAM, JR. Cons. Engr., 1522 West Lehigh Ave., Philadelphia, Pa.
- KUHL, HERMAN CHARLES. 211 South 4th St., West, Missoula, Mont.

ASSOCIATE MEMBERS (*Continued*)

- LAU, PERCY MAPES. Engr., Detroit Constr. Co., Ltd., P. O. Box 43, Pontiac, Mich.
- LAWSON, LAWRENCE MILTON. Project Mgr., U. S. Reclamation Service, Mills Bldg., El Paso, Tex.
- LOEWE, DAVID LUDWIG. Care, E. W. Hazzard, Woodmere, N. Y.
- McCRONE, ROSSITER MAGERS. Divisional Engr., Royal Irrig. Dept., Bangkok, Siam.
- McKINLEY, ARCH. Care, McClintic-Marshall Constr. Co., 407 Gay St., Phenixville, Pa.
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- WOOLWORTH, WENDELL HOWARD. Lieut., U. S. A., 28th Infantry, Pharr, Tex.

DEATHS

- BOWMAN, DANIEL WHEELER. Elected Member, December 3d, 1912; died March 13th, 1917.
- CLAPP, OTIS FRANCIS. (*Director.*) Elected Member, March 2d, 1898; died March 3d, 1917.
- DAVIS, JOSEPH PHINEAS. Elected Member, January 29th, 1868; died March 31st, 1917.
- DRURY, EDMUND HAZEN. Elected Member, October 4th, 1905; died January 31st, 1917.
- FROST, GEORGE HENRY. Elected Associate, January 4th, 1882; died March 15th, 1917.
- HUNTER, WILLIAM HENRY. Elected Member, February 7th, 1906; died February 27th, 1917.
- PICKETT, WILLIAM DOUGLAS. Elected Member, July 6th, 1853; Honorary Member, April 1st, 1914; died March 5th, 1917.

Total Membership of the Society, April 5th, 1917,
8 287.

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(March 2d to March 31st, 1917)

NOTE.—This list is published for the purpose of placing before the members of this Society, the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.

LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

- | | |
|---|---|
| (2) <i>Proceedings</i> , Engrs. Club of Phila., Philadelphia, Pa. | (31) <i>Annales de l'Assoc. des Ing. Sortis des Ecoles Spéciales de Gand</i> , Brussels, Belgium, 4 fr. |
| (3) <i>Journal</i> , Franklin Inst., Philadelphia, Pa., 50c. | (32) <i>Mémoires et Compte Rendu des Travaux</i> , Soc. Ing. Civ. de France, Paris, France. |
| (4) <i>Journal</i> , Western Soc. of Engrs., Chicago, Ill., 50c. | (33) <i>Le Génie Civil</i> , Paris, France, 1 fr. |
| (5) <i>Transactions</i> , Can. Soc. C. E., Montreal, Que., Canada. | (34) <i>Portefeuille Economiques des Machines</i> , Paris, France. |
| (7) <i>Gesundheits-Ingenieur</i> , München, Germany. | (35) <i>Nouvelles Annales de la Construction</i> , Paris, France. |
| (8) <i>Stevens Institute Indicator</i> , Hoboken, N. J., 50c. | (36) <i>Cornell Civil Engineer</i> , Ithaca, N. Y. |
| (9) <i>Industrial Management</i> , New York City, 25c. | (37) <i>Revue de Mécanique</i> , Paris, France. |
| (11) <i>Engineering</i> (London), W. H. Wiley, 432 Fourth Ave., New York City, 25c. | (38) <i>Revue Générale des Chemins de Fer et des Tramways</i> , Paris, France. |
| (12) <i>The Engineer</i> (London), International News Co., New York City, 35c. | (39) <i>Technisches Gemeindeblatt</i> , Berlin, Germany, 0, 70m. |
| (13) <i>Engineering News</i> , New York City, 15c. | (40) <i>Zentralblatt der Bauverwaltung</i> , Berlin, Germany, 60 pf. |
| (14) <i>Engineering Record</i> , New York City, 15c. | (41) <i>Electrotechnische Zeitschrift</i> , Berlin, Germany. |
| (15) <i>Railway Age Gazette</i> , New York City, 15c. | (42) <i>Proceedings</i> , Am. Inst. Elec. Engrs., New York City, \$1. |
| (16) <i>Engineering and Mining Journal</i> , New York City, 15c. | (43) <i>Annales des Ponts et Chaussées</i> , Paris, France. |
| (17) <i>Electric Railway Journal</i> , New York City, 10c. | (44) <i>Journal</i> , Military Service Institution, Governors Island, New York Harbor, 50c. |
| (18) <i>Railway Review</i> , Chicago, Ill., 15c. | (45) <i>Coal Age</i> , New York City, 10c. |
| (19) <i>Scientific American Supplement</i> , New York City, 10c. | (46) <i>Scientific American</i> , New York City, 15c. |
| (20) <i>Iron Age</i> , New York City, 20c. | (47) <i>Mechanical Engineer</i> , Manchester, England, 3d. |
| (21) <i>Railway Engineer</i> , London, England, 1s. 2d. | (48) <i>Zeitschrift</i> , Verein Deutscher Ingenieure, Berlin, Germany, 1, 60m. |
| (22) <i>Iron and Coal Trades Review</i> , London, England, 6d. | (49) <i>Zeitschrift für Bauwesen</i> , Berlin, Germany. |
| (23) <i>Railway Gazette</i> , London, England, 6d. | (50) <i>Stahl und Eisen</i> , Düsseldorf, Germany. |
| (24) <i>American Gas Engineering Journal</i> , New York City, 10c. | (51) <i>Deutsche Bauzeitung</i> , Berlin, Germany. |
| (25) <i>Railway Mechanical Engineer</i> , New York City, 20c. | (52) <i>Rigasche Industrie-Zeitung</i> , Riga, Russia, 25 kop. |
| (26) <i>Electrical Review</i> , London, England, 4d. | (53) <i>Zeitschrift</i> , Oesterreichischer Ingenieur und Architekten Verein, Vienna, Austria, 70h. |
| (27) <i>Electrical World</i> , New York City, 10c. | (54) <i>Transactions</i> , Am. Soc. C. E., New York City, \$12. |
| (28) <i>Journal</i> , New England Water-Works Assoc., Boston, Mass., \$1. | (55) <i>Transactions</i> , Am. Soc. M. E., New York City, \$10. |
| (29) <i>Journal</i> , Royal Society of Arts, London, England, 6d. | (56) <i>Transactions</i> , Am. Inst. Min. Engrs., New York City, \$6. |
| (30) <i>Annales des Travaux Publics de Belgique</i> , Brussels, Belgium, 4 fr. | |

- (57) *Colliery Guardian*, London, England, 5d.
 (58) *Proceedings*, Engrs.' Soc. W. Pa., 2511 Oliver Bldg., Pittsburgh, Pa., 50c.
 (59) *Proceedings*, American Water-Works Assoc., Troy, N. Y.
 (60) *Municipal Engineering*, Indianapolis, Ind., 25c.
 (61) *Proceedings*, Western Railway Club, 225 Dearborn St., Chicago, Ill., 25c.
 (62) *American Drop Forger*, Thaw Bldg., Pittsburgh, Pa., 10c.
 (63) *Minutes of Proceedings*, Inst. C. E., London, England.
 (64) *Power*, New York City, 5c.
 (65) *Official Proceedings*, New York Railroad Club, Brooklyn, N. Y., 15c.
 (66) *Gas Journal*, London, England, 6d.
 (67) *Cement and Engineering News*, Chicago, Ill., 25c.
 (69) *Der Eisenbau*, Leipzig, Germany.
 (71) *Journal*, Iron and Steel Inst., London, England.
 (71a) *Carnegie Scholarship Memoirs*, Iron and Steel Inst., London, England.
 (72) *American Machinist*, New York City, 15c.
 (73) *Electrician*, London, England, 18c.
 (74) *Transactions*, Inst. of Min. and Metal., London, England.
 (75) *Proceedings*, Inst. of Mech. Engrs., London, England.
 (76) *Brick*, Chicago, Ill., 20c.
 (77) *Journal*, Inst. Elec. Engrs., London, England, 5s.
 (78) *Beton und Eisen*, Vienna, Austria, 1, 50m.
 (79) *Forscherarbeiten*, Vienna, Austria.
 (80) *Tonindustrie Zeitung*, Berlin, Germany.
 (81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.
 (83) *Gas Age*, New York City, 15c.
 (84) *Le Ciment*, Paris, France.
 (85) *Proceedings*, Am. Ry. Eng. Assoc., Chicago, Ill.
 (86) *Engineering-Contracting*, Chicago, Ill., 10c.
 (87) *Railway Engineering and Maintenance of Way*, Chicago, Ill., 10c.
 (88) *Bulletin of the International Ry. Congress Assoc.*, Brussels, Belgium.
 (89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa., \$5.
 (90) *Transactions*, Inst. of Naval Archts., London, England.
 (91) *Transactions*, Soc. Naval Archts. and Marine Engrs., New York City.
 (92) *Bulletin*, Soc. d'Encouragement pour l'Industrie Nationale, Paris, France.
 (93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
 (95) *International Marine Engineering*, New York City, 20c.
 (96) *Canadian Engineer*, Toronto, Ont., Canada, 10c.
 (98) *Journal*, Engrs. Soc. Pa., Harrisburg, Pa., 30c.
 (99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, \$2.
 (100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., 50c.
 (101) *Metal Worker*, New York City, 10c.
 (102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.
 (103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
 (104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
 (105) *Metallurgical and Chemical Engineering*, New York City, 25c.
 (106) *Transactions*, Inst. of Min. Engrs., London, England, 6s.
 (107) *Schweizerische Bauzeitung*, Zürich, Switzerland.
 (108) *Iron Tradesman*, Atlanta, Ga., 10c.
 (109) *Journal*, Boston Soc. C. E., Boston, Mass., 50c.
 (110) *Journal*, Am. Concrete Inst., Philadelphia, Pa., 50c.
 (111) *Journal of Electricity, Power and Gas*, San Francisco, Cal., 25c.
 (112) *Internationale Zeitschrift für Wasser-Versorgung*, Leipzig, Germany.
 (113) *Proceedings*, Am. Wood Preservers' Assoc., Baltimore, Md.
 (114) *Journal*, Institution of Municipal and County Engineers, London, England, 1s. 6d.
 (115) *Journal*, Engrs.' Club of St. Louis, St. Louis, Mo., 35c.
 (116) *Blast Furnace and Steel Plant*, Pittsburgh, Pa., 15c.

LIST OF ARTICLES

Bridges.

- Bascule Bridge Over the Chicago River.* (12) Feb. 23.
 Inspection and Maintenance of Railway Bridges. H. C. Keith. (Abstract of paper read before Brooklyn Engrs. Club.) (17) Feb. 24.
 Method of Moving a 3-Span Steel Bridge.* (86) Feb. 28.
 Methods and Cost of Erecting the St. Paul, Nebraska State Aid Bridge. George K. Leonard. (86) Feb. 28.
 Method for Finishing Concrete Surfaces with Carborundum Brick (For Use on Bridges).* W. M. Conway. (Paper read before Road School at Madison, Wis.) (86) Feb. 28.
 Prices of Bridge Construction Materials. M. M. Tokelson. (Paper read before Annual Road School of the Wisconsin Highway Commission.) (86) Feb. 28.

* Illustrated.

Bridges—(Continued).

- Timber Bridge Floor Fires with Special Reference to McKinley Bridge Fire.*
Hermann von Schrenk. (13) Mar. 1.
- Features of a City Viaduct Over Railway Tracks.* (13) Mar. 1.
- Crack in New Concrete Arch Explained by Freezing of Pocketed Water.* A. W. Zesiger. (13) Mar. 1.
- Coppermill Bridge at Wraybury.* R. N. Stroyer. (12) Mar. 2.
- Shift Three Truss Spans in Two Moves to Replace Old Girders: Dayton Bridge Over Miami River.* (14) Mar. 3.
- Reinforcing the Poughkeepsie Bridge. (13) Mar. 8.
- Building Bridge Piers in the Mississippi River.* C. F. Womelsdorf. (13) Mar. 8.
- Design and Construction Details of a Long Concrete Arch Bridge.* C. D. Hale. (13) Mar. 8.
- Combined Concrete Arch Bridge and Concrete Dam.* (13) Mar. 8.
- Sinking Concrete Cylinders Under a Philippine Bridge. A. T. Sylvester. (From *Quarterly Bulletin of the Public Works, Philippine Islands.*) (13) Mar. 8.
- Bridge Pier Girders with Beveled Bearing Plates on Masonry.* (13) Mar. 8.
- Extending Piers for Double-Tracking Bessemer and Lake Erie Allegheny River Bridge.* (13) Mar. 15.
- Deep Dredging Piers and Multiple Pneumatic Pier on the Thames Bridge.* (13) Mar. 15.
- Charts for Eccentric Loading on Rectangular Areas (For Use in Bridge Foundations). (96) Mar. 15.
- New York Connecting Railroad Finished (Hell Gate Bridge Dedicated).* (15) Mar. 16.
- Chicago Has Problem to Protect Street Traffic at Drawbridges.* F. H. Avery. (14) Mar. 17.
- Slide Causes Collapse of Seattle Bridge Approach.* (14) Mar. 17.
- Cantilever Highway Bridge Over the Mississippi.* (13) Mar. 22.
- Pleasing Architectural Appearance of the Central Bridge at Lawrence.* E. K. Cortright. (13) Mar. 22.
- Deep Foundations of Metropolis Bridge; Built Under 51 Lb. of Air.* W. McCready. (13) Mar. 22.
- Note sur le Pont de Chambilly, sur la Loire.* Labadie. (43) Sept., 1916.
- Emploi du Système de Calage à Leviers Coudés "Toggle" pour les Ponts Mobiles.* Boucher. (33) Mar. 10.
- Brücke in armierten Beton über die Glatt in Dübendorf.* (107) Feb. 3.

Electrical.

- Protecting Electric Machines Against No-Voltage.* H. M. Phillips. (64) Feb. 13.
- Some Improvements in Electrical Apparatus. R. R. Smith. (Paper read before Lancashire, Cheshire, and North Staffordshire Branch of the Assoc. of Min. Elec. Engrs.) (47) Feb. 23.
- Care and Maintenance of Rotary Converters.* (From Booklet Issued by British Westinghouse Electric and Manufacturing Company, Ltd., of Manchester.) (47) Feb. 23.
- The Possibilities of the Lighting Load.* William A. Durgin. (27) Feb. 24.
- Performance of Two Successful Windmill Generating Plants.* Frank S. Culver. (27) Feb. 24.
- Electricity vs. Other Power for Coal Mines.* Cornelius Weber. (27) Mar. 24.
- Electric Motor Drive in Paper Mills.* (27) Feb. 24.
- Analyzing Growth of Central-Station Load.* W. S. Leffler. (27) Feb. 24.
- The Electrical Study Course.* (64) Serial beginning Feb. 27.
- Temporary Electric Heaters.* N. L. Rea. (64) Feb. 27.
- Flood Lighting. L. C. Porter. (Abstract of paper read before Illuminating Eng. Soc., Philadelphia Section.) (2) Mar.
- Electrical Machinery Tests and Specifications Based on Modern Standards. H. M. Hobart. (42) Mar.
- Relays for High-Tension Lines.* Philip Torchio. (42) Mar.
- The Protective Relay Equipment on the System of the Commonwealth Edison Company.* R. F. Schuchardt. (42) Mar.
- Construction and Operation of a Connecticut Hydroelectric System.* (27) Mar. 3.
- Entering an Age of Greater Electric Service: Union Electric Light and Power Company Defends Its Rates. (27) Mar. 3.
- Recording Watts and Volt-Amperes Simultaneously.* Henry H. Lyon. (27) Mar. 3.
- The Ford Plant Switchboard.* Thomas Wilson. (64) Mar. 6.
- Barge with Plow Lays Cables 12 Ft. Below Bottom of Channel.* Paul J. Ost. (13) Mar. 8.
- Electricity Meters. J. Rennie. (Abstract of paper read before Assoc. of Supervising Electricians.) (73) Mar. 9; (47) Feb. 23.
- The Summer Time Act: Economies in Artificial Light and Fuel. (104) Mar. 9.

* Illustrated.

Electrical—(Continued).

- Effect of Direction of Grain on Magnetic Properties of Silicon Sheet Steel.* L. W. Chubb and T. Spooner. (Abstract of Article from *Electric Journal*.) (73) Mar. 9.
- The Phasing-Out of an Underground System: Methods Used to Identify Conductors and Properly Connect Three-Phase Feeder Cables in a Substation.* G. W. Tefteau, Jr. (27) Mar. 10.
- Characteristics of Standard Inclosed Fuses.* Walter Arthur. (27) Mar. 10.
- Prevention of Sleet Trouble on High-Tension Transmission Lines.* Ralph L. Thomas. (27) Mar. 10.
- Rehabilitation Without Service Interruption: How a New 1800-Kw. Station was Built on the Site of an Old Power Plant Building at a Cost of \$35 000.* (27) Mar. 10.
- Installation of Fibre Duct Lines in Concrete: Features of Underground Concrete Conduit Construction When Using Fibre Duct.* (27) Mar. 10.
- The Putting in of the Wise Power Plant (Pacific Gas and Electric Company). (111) Mar. 15.
- Motor Drives in a Screw and Bolt Plant.* L. J. Lamberger. (27) Mar. 17.
- Part-Slot Fractional-Pitch Windings: Effect of Armature Winding Distribution on the Electromotive Force Wave Shape as Generated by Non-Sinusoidal Field Forms.* Theo. Schon. (27) Mar. 17.
- Forces Acting on Disconnecting Switches.* Julian Loebenstein. (27) Mar. 17.
- Tieing Together Water and Steam Power: Connecticut Power Company to Operate Its Falls Village Hydroelectric Plant in Parallel with Hartford Electric Company's Steam Plant.* (27) Mar. 17.
- Reconnecting Induction Motors—Diagrams of Semi-Closed Slot Windings.* A. M. Dudley. (64) Mar. 20.
- Power Supply and Development in Japan and Chosen (Corea). Ludwig W. Schmidt. (64) Mar. 20.
- Should Central Stations Wire Houses? A General Discussion of the Question Through a Medium of Letters from a Number of Central Stations. Earl E. Whitehouse. (27) Mar. 24.
- Memphis' 600 000 Kw.-Hr. Vehicle Load.* O. H. Caldwell. (27) Mar. 24.
- Engine Testing Made Cheaper and More Rapid by Electricity.* (27) Mar. 24.
- Some Aspects of the Power Situation in New England.* Charles H. Bromley. (64) Mar. 27.

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- Alquist Gearing for Ship Propulsion. W. L. R. Emmet. (Paper read before Am. Soc. of Naval Architects and Marine Engrs.) (47) Feb. 23.
- On the Acoustic Efficiency of Fog Signal Machinery.* Louis Vessot King. (3) Mar.
- Six Years' Development of the Werkspoor Marine Diesel Engine.* Thomas Orchard Lisle. (55) Mar.
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- Engineering Phases of Smoke Abatement. Osborne Monnett. (58) Dec., 1916.
- An Outline of the Theory of Heat Transmission and Absorption in Application to Ordinary Engineering Problems.* John E. Bell. (58) Jan.
- New High-Pressure Central Steam Plant.* Claude Hartford. (64) Feb. 6.
- Some Results of Recent Work in Surface Combustion.* Henry L. Read. (64) Feb. 13.

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 Gas-Fired Japanning Ovens for Automobile Finishing.* J. H. MacVeigh. (From *Bulletin of United Gas and Electric Eng. Corporation.*) (24) Feb. 24.
 Newport, R. I., Company's New Installation Characterized by Low Labor Cost and Fine Quality of Coke.* J. K. Quinn. (Paper read before New England Assoc. of Gas Engrs.) (24) Feb. 24; (83) Mar. 1.
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- Gas-Works in War Time: A Review of the Berlin Works of the Imperial Continental Gas Association. E. Korting. (Abstract Translation from *Journal für Gasbeleuchtung*.) (66) Serial beginning Mar. 6.
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- The Properties of Bronzes for Mechanical Purposes. H. S. Gulick. (Abstract of paper read before St. Louis Foundrymen's Club.) (47) Mar. 9.
- Boiler-House Operation and Maintenance.* T. G. Otley and Verney Pickles. (Abstract of paper read before South African Institution of Engrs.) (47) Serial beginning Mar. 9.
- The Properties of Semi-Steel Castings. David McLain. (Abstract of paper read before Am. Foundrymen's Assoc.) (47) Mar. 9.
- Tests of Gasoline for Motor Car Engines. W. F. Rittman. (From report to U. S. Bureau of Mines.) (47) Mar. 9.
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- Brass Manufacture in a Modern Plant: Expansion of the Industry as Illustrated by the Stamford Rolling Mills Company.* W. E. Freeland. (20) Serial beginning Mar. 29.
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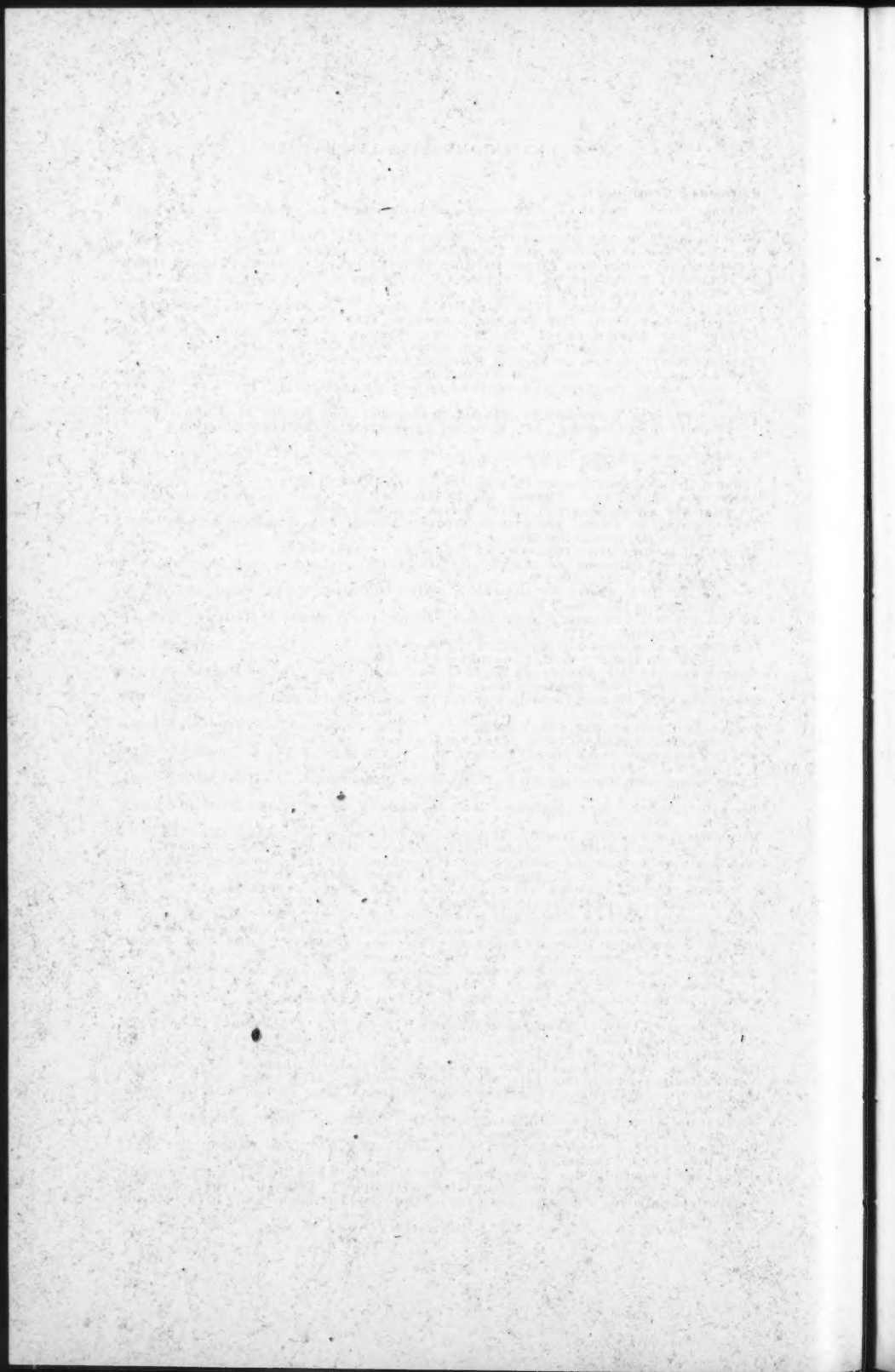
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- The Locomotive Fire Box and Combustion Chamber.* J. T. Anthony. (Paper read before Southern and Southwestern Railway Club.) (18) Mar. 3; (86) Feb. 21.
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- Rapid Transit Plan for Sydney. (Abstract of report by Department of Public Works, Sydney.)* (17) Mar. 3.
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